Gateway

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The ARRL Packet-Radio Newsletter

UP, UP AND AWAY! TO 56 KBIT/S!

On April 11, 1987 at 5 PM, the first (as far as we know) amateur packet radio QSO at 56 kbauds was completed between WA4DSY and KD4NC over a path of 17 miles on 430 Mhz. The QSO was error free.

The RF modem was designed and built by Dale, WA4DSY over the last 18 months. The RF gear has been working for some time; the biggest problem was in obtaining useful packet digital signals at the modem's rated speed.

Here are some specifics of the modem.

The operating frequency is determined by a crystal in the modem and by the transverter type used. At present, Microwave Modules MMT 432/28S transverters are being used during our trials. 220-MHz transverters have been used with equally good success. 144-MHz transverters are available, and 902-MHz units should be available from the manufacturer at a later date.

Output power: 6 watts
Bandwidth: 70 kHz (can be easily changed to 9600-bauds at a lower bandwidth for LAN use)
Modulation: Bandwidth-limited MSK generated by digital state machine. Frequency shift of 14 kHz (1/4 baud rate). Phase shift of +/- 90 degrees for each bit, with amplitude variations of 3 dB.
Transmitter: Exciter operates at 29 MHz with 1-milliwatt output. Crystal-controlled carrier modulated by two doubly balanced modulators (MC1496). Bandwidth-limited modulation waveforms generated by digital state machine. MMT 432/28 transverter used to convert 29 MHz to 433 MHz.
Receiver: Sensitivity of 1 uV with low error rate. 1st IF 29 Mhz, 2nd IF 10.7 Mhz, 3rd IF 455 Khz. Uses custom LC 70-kHz-wide, 455-kHz IF filter. Demodulation by MC3359 quadrature detector chip.
Data format: Synchronous

Scrambler: $X = X^{-17} + X^{-5} + 1$ (17 Bit shift register with taps at bits 17 & 5).
Interface: TTL/CMOS using signals: RTS (request to send) (PTT), RXD (received data), RXC (receiver clock), TXC (transmitter clock), TXD (transmit data), GND (ground) and CD (carrier detect). 9-pin D connector on test units.

The connection was carried out between two computers running KA9Q Internet software using the K3MC KISS code running in a TNC-2 clone as modified by WA4DSY. Changes were necessary to increase the throughput to 56 kbit/s on the radio link.

The asynchronous KISS connection to the PC was operated at 19200 bit/s due to limitations in the host code (fixable) and the bit rates available in the TNC clone. This is still quite useful since several network nodes "see" the shared 56-kbit/s channel as a nonshared 19200 bit/s channel.

Work continues on a board to replace the TNC entirely, since the design uses very few of the TNC's features. This board, along with changes in the Internet code, should allow us to speed up the KISS connection to the host.

Work also continues on an 8530 driver and several 8530 boards to allow connection of the modem directly to the PC.

The modem is implemented on three (soon to be four when the processor board is done) double sided printed-circuit boards. The 432-MHz transverter costs $300, and parts cost for the remainder of the circuit is estimated at $200 bringing the total cost of a 56-kbaud terminal to $500+. The circuit boards are not yet available. An announcement will be made when arrangements have been completed.

GRAPES (Georgia Radio Amateur Packet Enthusiasts) will install a test link using Dale's modems between the two IP switches planned for Atlanta Metro District East and West Atlanta LAN sites.

From Fred Moore, N4CLA via KD4NC

PACKET TECHNICAL ARTICLES SOLICITED

Have you developed a unique new application for packet radio? Maybe you've hooked your TNC to your keyer so you can send packet Morse... or connected to yourself via LDE? Or perhaps you've contributed an innovation to the technology... found the magic cure to all those computer RFI problems... or developed a modem that sends at 100 kbit/s in a 10-Hz bandwidth? Well then, tell the world!

QEX, the ARRL Experimenters' Exchange newsletter, is looking for articles about technical/experimental subjects about packet radio (and other subjects as well!) If you want to become world famous, obtain the undying gratitude of the amateur packet community and make a few bucks, write for QEX! For information, contact Maureen Thompson, KA1DYZ, QEX Assistant Editor, ARRL, 225 Main Street, Newington, CT 06111.

X.25-BASED NETWORK SWITCH SOFTWARE AVAILABLE

COSI-Switch is a Connection-oriented, Open Systems Interconnection type packet switch which conforms to the CCITT Recommendation X.25. It was written by Howard Goldstein, N2WX with protocol specification support from Gordon Beattie, N2DSY and Thomas Moulton, W2VY.

The Open System Interconnection model is a blueprint for systems not bound to the design methodologies or marketing objectives of private companies like IBM or DEC, or of governmental agencies such as the US Department of Defense. Instead these protocols have been developed and agreed upon by telecommunications carriers and users groups. This blueprint defines the various aspects of communications in terms of a seven level stack. This switch provides all required network services needed to inter-connect remote users as defined in CCITT X.213. Connection establishment, data transfer and connection clearing functions are supported. Proper packet sequencing and remote user status are provided to the COSI-Switch user.

COSI-Switch software allows users to connect through the Amateur Packet Network transparently to a correspondent station without the worry (and bother!) of setting up connections on a step-by-step basis. All a user need do is connect to his local switch and then "call" his correspondent station at the station's home node.

It's just like dialing a telephone and just as simple !

"C N4XXX @ 404010" will get you a connection to a remote user.

Naturally, network connectivity will be a limiting factor, but that is rapidly changing.

Highlights

True implicit addressing
Network determined routing
Abbreviated addressing
Hop-by-hop acknowledgements between switches
Faster response time
FCC acceptable AX.25 level 2 source and destination address fields preserved
Easily extensible networking plan
Support for AX.25 level 2 users
Support for X.25 level 3 users
Enhanced digipeater support
Simple command interface
Identical local and remote switch commands
Calling "CQ"
Online help
Online information
Remote and local USER list
Remote and local NODE list
Security system for remote control

System Overview

Written in the C language by Howie Goldstein, N2WX, COSI-Switch is based on the popular AX.25 Link protocol, and the CCITT X.25 Packet protocol. The use of the C language will allow rapid "porting" of the software to other hardware.

It is available to Amateurs free of charge for non-commercial use.

The initial software release will be targeted for the TNC-2s (and clones) and the Pac-Comm DR-200. Other machines will be supported in future releases.

A simple 27256 EPROM contains all the required software. This software is configured using an asynchronous terminal on the TNC-2 console port or the DR-200 Terminal Adapter. Configuration is performed through a series of prompts.

With the COSI-Switch, the user need not worry about how the network is routing his connection; the switch takes care of that. The switch has a number of commands which will aid the user in determining the status of remote users and nodes. Of particular interest are the NOdes, RXlist, and CQ commands.

Availability

The Radio Amateur Telecommunications Society (RATS) is distributing the COSI-Switch X.25 Level 3 switch software to the amateur community via NJIT EIES (DRNET), Compuserve HamNet, the amateur packet network and the US Mail.

The distribution of software will begin in early May. Look for the announcement message.

RATS may be contacted at:

206 North Vivyen Street
Bergenfield, NJ 07621

We may be contacted on Compuserve HamNet by sending an inquiry to: Dave, KD6TH 70545,1271; via EIES DRNET by sending a message to N2DSY; and via Amateur Packet Radio by sending a message to: N2DSY @ KD6TH/03100201

Online downloading of the EPROM image or hex file is available to those who have the capability to "burn" EPROMs. If required, a package of documentation and an EPROM is available from RATS by mail. This mail service costs $ 15.00 to cover the expense materials and postage.

From RATS

SUPERPACKET?

What's faster than a speeding radiogram and able to leap across countries in a single bound -- besides Superman? The packetgram, a piece of formal message traffic sent by packet radio! Wisconsin's crack traffic handler in Greenfield, Les Peterson, W9YCV, decided to compare the speed of radiograms and packetgrams.

Les devised a test soon after he got acquainted with packeteer Tad, KT7H, in Seattle, WA. The plan was for KT7H to simultaneously send duplicate messages to W9YCV at 1800Z, one by packet radio and another through the National Traffic System (NTS).

And now for the results. At 2100Z, Les checked the WD9DHI BBS and found the message waiting there; it had taken three hours to arrive. Besides the 15-word test message, the packetgram included a description of the test. [Presumably for the benefit of those "reading the mail" along the forwarding path -- Ed.] Les looked at his

monitor screen, said "Wow! That's fast!" and quickly sent a reply to Tad. Les would find out later that his reply got to Tad in Washington state the same evening.

Meanwhile, what of the radiogram sent via the NTS nets? Tad put it on the Washington section net, from which it was relayed to 7RN and then to PAN that evening. The next day the radiogram was listed on CAN, then relayed to 9RN. One more day and it was on the Wisconsin Sideband Net where Jeff, NI9E, picked it up and delivered the 15-word message by telephone to Les' wife Grace. Les received the message very soon afterward. It took three days and quite a few dedicated traffic handlers to relay this radiogram from Seattle to Greenfield.

Who's the winner? Well it took three days for the NTS path and three hours via packet BBSs, a 24-to-1 ratio. One caveat: this brief test cannot be considered typical. Often, delays occur that render the packet system as slow as or slower than the NTS nets. The test does demonstrate the capabilities of packet for formal message handling, though, and packet is error free.

By Rich Regent, K9GDF, Wisconsin SM

PACKET NTS IN INDIANA

Responding to a Gateway article about packet NTS (NTS ON PACKET: A REPORT FROM THE FIELD, Gateway Volume 3, Number 15), Jay Farlow, WB9MDS sends us the following report:

I've been an NTS operator for over 10 years. I first became interested in packet when I visited a friend's station during the summer of 1985. Even then, I believed packet had great potential for NTS. When I got my TNC that fall, I started investigating ways to use the mode to pass traffic.

One of the first things I noticed was a fair number of active packeteers in northwest Indiana. I'd also noticed that the voice and CW NTS section nets often had trouble clearing traffic bound for that area. So I began encouraging the packet operators there to deliver it... and began accepting it on the HF nets for transmission to them.

Helping the HF section nets deliver traffic for which they have no other takers remains the primary goal of Indiana packet NTS operators. I wrote a series of articles in the Indiana Digital Experimenter's Association (IDEA) newsletter, describing how this could be done. I encouraged Indiana packeteers who were willing to accept traffic for delivery to let me know. I disseminated a list to all Indiana PBBSs which included the call sign of each volunteer, the call sign of his local PBBS and the cities/counties for which he would accept traffic.

Packet operators who are active on HF section nets listen for unclaimed traffic. They check the list to see if a packet operator has volunteered to handle traffic for those destinations. They offer to take such messages from the HF net and send them to their local PBBS for autoforwarding to the appropriate destination PBBS.

Lately, as more Indiana hams equip for packet, some have originated traffic for destinations covered by the list. This traffic goes from origination to delivery entirely via packet. But Indiana packeteers haven't tried to replace the existing National Traffic System, only to assist it.

Our means are still somewhat simplistic. But that's mostly a function of the small number of participants, and the small number of PBBSs. I hope that the future will bring complete coverage of the state by both. At that time, operators will no longer need to consult a list before putting traffic into the Indiana packet NTS. They'll just determine the call sign of the PBBS closest to the destination and send it there.

Most of the out-of-state traffic we handle now comes into Indiana via the NTS Ninth Region Net. But if out-of-state packet operators address traffic to NTSIN, it goes to Indiana's HF gateway, W9ZRX, near Indianapolis. Packet NTS operators in the Indy area keep their eyes out for such traffic. If its destination is on our list, they may re-address it to the appropriate PBBS for autoforwarding on 145.01 MHz. Or, they may remove it from the PBBS for transmission on a voice or CW NTS net. This is why all operators should use proper NTS form for messages sent via packet. Even though, for example, the check might seem unnecessary on an error-free mode, retransmission on voice or CW might be necessary at some point prior to delivery.

By Jay M. Farlow, WB9MDS

LINKING THE MIDWEST

On March 21, 1987 a group of packet BBS SYSOPs met in Dayton, OH to begin planning the construction of a 220-MHz backbone network for the midwest. The purpose of the network is to provide high-speed traffic forwarding.

The first stage of the network will connect the Columbus, Dayton, Indianapolis, Cincinnati triangle. Eventually, the network will join with backbone systems connecting into Pennsylvania and Illinois, providing a major high-speed backbone network between the east coast and the west.

The NET/ROM system [see Gateway Volume 3, Number 12] was selected as the standard for the backbone network. Each network node will have two or more ports, thus providing access to local area networks and HF gateways. Initial operation will begin using 1200-baud transmissions; however, the goal is to increase the backbone speed to 9600 bauds.

Participating SYSOPs are AD8I, KC8TW, KD9PU, KM9D, NK8T, N8NN, WA8ERQ, W8CQK and W9ZRX.

By Albert B. Garcia, N8NN

RS-232-WHAT???

The April, 1987 issue of Data Communications magazine reports that the Electronics Industries Association (EIA) has announced publication of a new version of the familiar RS-232 specification, to be called RS-232-D. This will replace the

current version, RS-232-C. There's no need to rewire your TNC's connector, though, as RS-232-C equipment won't become obsolete. The new version of the standard simply adds new circuits and pin assignments to support loopback and testing modes and updates the specification.

NEW PACKET BOOK FROM TAB

TAB Books, of Blue Ridge Summit, PA, has announced the May, 1987 publication of The Packet Radio Handbook, by Jonathan L. Mayo, KR3T. According to TAB, the book covers the history, operation, applications and technical principles of packet radio. The 218-page paperback is priced at $14.95. For more information, contact TAB Books, Inc, PO Box 40, Blue Ridge Summit, PA 17214.

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